

REMARKS

The Office Action dated October 28, 2002 has been received and carefully noted.

The following remarks are submitted as a full and complete response thereto. By this Amendment, claim 2 has been further amended to more particularly and distinctly claim the invention. No new matter has been entered or amendments made that narrow the scope of any elements of any claim. Accordingly, claim 2 is pending in this application and is submitted for consideration.

Claim 2 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. By this Amendment, it is respectfully submitted that the Examiner's rejection has been overcome. Therefore, the rejection is requested to be withdrawn.

Claim 2 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' admitted prior art (AAPA) in view of Ruehl et al. (U.S. Patent No. 6,216,763, "Ruehl") or Leith (U.S. Patent No. 6,173,628).

In making this rejection, the Office Action took the position that AAPA discloses all the elements of the claimed invention, except that AAPA uses a welding technique instead of a molding technique to join the frame members. Ruehl and Leith were cited for disclosing this limitation. However, Applicants respectfully submit that claim 2 recites subject matter that is neither disclosed nor suggested in any combination of the prior art.

Claim 2 recites a method for joining frame members made of an aluminum alloy. The method includes directly fitting a part of each of the frame members into respective grooves formed in a mold, and wrapping up the part of the frame members fitted into the respective grooves of the mold in cast metal. The part of the frame members fitted in

the mold do not contact with each other and the respective grooves are adapted to accommodate a specific frame member.

The Office Action took the position that the prior art discloses all of the elements of the claimed invention. However, it is respectfully submitted that the prior art fails to disclose or suggest the structure of the claimed invention, and therefore, fails to provide the advantages of the present invention. For example, in the method for joining frame members of the present invention, frame members are fit in a mold and the part of the frame members that are fitted in the mold are wrapped up cast metal.

As a result of the claimed process, each of the frame members can be joined without forming the intricate configuration on an end part of the frame members, and without using a joining member. Consequently, the frame members are joined without a welding procedure and the manufacturing process is thus simplified. Each of the frame members is joined with superior positional precision without using a specific joining part, because each of the frame members is joined by wrapping up the connecting part in cast metal. Moreover, if an irregularity of the shape occurs at the end part of the frame members when casting, the irregularity of the shape can be absorbed within a mold.

In the present invention, as shown in Figs. 2A and 2B, tip parts of each frame member are not in contact with each other in the mold, as recited in claim 2. When the molten metal is poured into the mold, since aluminum material is easily deformed with heat, the deformation of the aluminum may be increased by the heat of molten metal. Thus, as a benefit of the claimed invention, if a deformation, such as expansion and contraction, of the frame member arises, since each frame member does not contact

with the other, and the space for allowing the deformation is provided in the mold, the affect of the deformation is absorbed in the mold.

Furthermore, in the present invention, the frame members and are engaged with each of the fitting grooves, respectively. Since each of the fitting grooves is sized for fitting the frame members therein, each the frame members are firmly fixed at each of the respective fitting grooves.

Thus, as a further benefit of the claimed invention, the positions of the frame members do not change once the sash and the frame members are engaged with each of the fitting grooves. Therefore, the frame members are joined and fixed with positional accuracy, without utilizing a joining member.

Ruehl discloses a cast node and method for casting nodes. As shown in Figure 1, members 101 and 102 are fixed in place by fixtures 105 and 106. Dies 110 and 111 are positioned to surround the mating portions 103 and 104, respectively, of elements 101 and 102. Dies 110 and 111 define a cavity 120. The cavity 120 is shaped to encompass the mating portions 103 and 104, respectively, of elements 101 and 102. After dies 110 and 111 are closed around elements 101 and 102, a moldable material is introduced into the die cavity 120. The material fills the cavity 120 and forms a single continuous mold element which envelopes mating portions 103 and 104, respectively, of elements 101 and 102.

However, contrary to the present invention, in Ruehl, each of the frame members 101 and 102 is fixed using the fixtures 105 and 106, as joining members. Thus, positional accuracy of each of the frame members 101 and 102 in the molds 110 and

111 is not obtained because the frame members 101 and 102 are not directly fitted into the molds 110 and 111.

Leith discloses a multi-piece crankshaft construction. As shown in Figure 1, the crankshaft 10 is formed by casting the counterweight 16 from a thermosetting material 70 around registering ends 20 and 18 of both the crankpin 14 and main shaft 12. As shown in Figure 2, a mold 30, having two mold halves 32 and 34, forms a mold cavity 36 corresponding in shape to the counterweight 16. With the main shaft 12 and crankpin 14 positioned in the mold sections 32 and 34, respectively, a liquid thermosetting material 70 is introduced and fills the mold chamber 36 which corresponds to the shape of counterweight 16. The liquid material encases the registering ends 18 and 20 of the main shaft 12 and crankpin 14, respectively.

As shown in Figure 2 of Leith, the crankpin 14 and the main shaft 12 have a straight shape. Thus, if the crankpin 14 and the main shaft 12 are pulled sidewardly, they may be pulled off or moved relatively easily.

However, the present invention relates to a method for joining frame members by fitting a part of each of the frame members into a mold. For example, in the present invention, one of the frame members has a bent end part formed in a curved shape. A part of each of the frame members is wrapped up in cast metal. Thus, as another benefit of the claimed invention, when the sash is pulled sidewardly after wrapping up, since the curved end part disturbs the pop-out of the frame member from the cast metal, the joint rigidity of the joining part becomes higher than that of Leith.

Furthermore, as still another added benefit of the claimed invention, the wrapped part of the frame members can be made as wide as possible, which is contrary to the

teachings of Leith, because there is a spatial margin in the mold and a wide range of each of the frame members are positioned in the mold. Thus, the joint rigidity of the joining part can be improved and the following advantages are obtained: the flapping of the door can be reduced; and the generation of the whistling sound at the time of driving the vehicle can be reduced.

The Office Action took the position that both Ruehl and Leith disclose placing frame members inside a mold cavity and then injecting molten material around the frame members to join the same. The Office Action asserted that this molding technique forms a stronger joint because the molding material provides a greater joining area. However, as discussed above, neither Ruehl nor Leith, either alone or combination discloses or suggests the claimed invention.

Thus, it is respectfully submitted that the Applicants' invention, as set forth in claim 2, is not obvious within the meaning of 35 U.S.C. § 103.

Claim 2 was also rejected under 35 U.S.C. § 103(a) as being unpatentable over Ruehl. In making this rejection, the Office Action took the position that if the members of Ruehl are considered to be frame members, then it would be obvious to use the technique of Ruehl to join the frame members made of any metal, including an aluminum alloy.

Firstly, as discussed above, Ruehl fails to disclose or suggest the claimed invention. Secondly, in the present invention, each of the frame members is made of aluminum alloy, as recited in claim 2. Since aluminum alloy is easily deformed by heat, the part of the frame members fitted in said mold in cast metal might be deformed. Thus, the pop-out of the curved part of the frame members from the cast metal

will be disturbed by the other deformed frame members. If another metal material is used instead of aluminum alloy, the deformation of the metal material does not always arise because deformational characteristics of another metal material differ from aluminum alloy.

Thus, it is respectfully submitted that the Applicants' invention, as set forth in claim 2, is not obvious within the meaning of 35 U.S.C. § 103.

In view of the foregoing, reconsideration of the application, withdrawal of the outstanding rejections, allowance of claim 2, and the prompt issuance of a Notice of Allowability are respectfully solicited.

If this application is not in condition for allowance, the Examiner is requested to contact the undersigned at the telephone listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, referencing docket number 106145-00021.

Respectfully submitted,
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Enclosures: Marked-up Version of Claim

MARKED-UP VERSION OF CLAIM

Please amend claim 2 as follows:

2. (Twice Amended) A method for joining frame members made of aluminum alloy comprising the steps of:

fitting a part of each of the frame members into a mold; and
wrapping up the part of the frame members fitted in said mold in cast metal;
wherein the part of the frame members fitted in said mold do not contact each other.